



Average Offsets of the Local Vertical Datums in New Zealand Relative to the World Height System

Robert Tenzer (1), Ahmed Abdalla (1), Viliam Vátrt (2), and Nadim Dayoub (3)

(1) School of Surveying, Faculty of Sciences, University of Otago, 310 Castle Street, Dunedin, New Zealand, (2) Military Geographic and Hydrometeorologic Office, Cs. odboje 676, 518 11 Dobruška, Czech Republic, (3) School of Civil Engineering and Geosciences, Newcastle University, Newcastle upon Tyne, NE1 7RU, United Kingdom

Abstract: We determine the average offsets of 12 major local vertical datums (LVDs) in New Zealand relative to the World Height System (WHS). The LVD offsets are estimated using the EGM2008 global geopotential model coefficients complete to degree 2160 of spherical harmonics and the GPS-levelling data. The WHS is defined by the currently adopted best-estimated geoidal geopotential value $W_0 = 62636856 \text{ m}^2 \text{ s}^{-2}$. Our test results reveal that the average offsets of 12 major local vertical datums situated throughout the South and North Islands of New Zealand range from -0.25 to 1.34 m . The EGM2008 and GPS-levelling data are further used to compute the differences between the NZGeoid05 regional quasigeoid model and the EGM2008 global quasigeoid model. The same analysis is done for the NZGeoid09 which is the latest version of the official national quasigeoid model for New Zealand. The numerical results at the network of GPS-levelling points show that the differences between the NZGeoid05 and the EGM2008 quasigeoid models vary from 0.24 to 0.81 m with the mean of 0.56 m . The corresponding differences between the NZGeoid09 and the EGM2008 quasigeoid models vary from 0.27 to 1.14 m with the mean of 0.51 m .

Keywords: *geoidal geopotential value, GPS-levelling data, local vertical datum, World Height System*